

**OREGON COASTAL NONPOINT PROGRAM
NOAA/EPA FINAL FINDING**

FOREWORD

This document contains the bases for the final determination by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) (collectively, the federal agencies) that the State of Oregon (State) has failed to submit an approvable Coastal Nonpoint Pollution Control Program (Coastal Nonpoint Program) as required by Section 6217(a) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), 16 U.S.C. 1455b. NOAA and EPA arrive at this decision because the federal agencies find that the State has not fully satisfied all conditions placed on the State's Coastal Nonpoint Program.

On January 13, 1998, the federal agencies approved the Oregon Coastal Nonpoint Program subject to specific conditions that the State still needed to address (see "Oregon Conditional Approval Findings"). Since then, the State has made incremental modifications to its program and has met most of those conditions.

On December 20, 2013, the federal agencies provided notice of their intent to find that the State has not fully satisfied the conditions related to new development, onsite sewage disposal systems (OSDS), and additional management measures for forestry (see "Oregon Coastal Nonpoint Program NOAA/EPA Proposed Finding"). The federal agencies invited public comment on the proposed findings relating to these conditions, as well as the extent to which those findings support a finding that the State failed to submit an approvable program under CZARA. Based on concerns the federal agencies had heard about agriculture nonpoint source management in the state, the federal agencies also invited public comment on the adequacy of the State's programs and policies for meeting the CZARA 6217(g) agriculture management measures and conditions placed on Oregon's Coastal Nonpoint Program. Because the December 20, 2013's notice of intent did not propose a specific decision on whether or not Oregon had satisfied the CZARA 6217(g) agriculture management measures and the public did not have an opportunity to comment on a specific proposed decision and rationale for that decision, the adequacy of Oregon's agriculture programs is not a basis for the final findings that Oregon has failed to submit an approvable coastal nonpoint program. The public will have an opportunity to comment on NOAA and EPA's proposed decision regarding the agriculture management measures at a later date. (See "NOAA and EPA Response to Comments Regarding the Agencies' Proposed Finding that Oregon has Failed to Submit a Fully Approvable Coastal Nonpoint Program" for a summary of the comments received and NOAA and EPA's response to them.)

In response to NOAA and EPA's proposed findings, Oregon provided an additional submission in support of its coastal nonpoint program on March 20, 2014 (see "Oregon's Response to Proposed Disapproval Findings").

NOAA and EPA have carefully reviewed the public comments received and the State's March 2014 submission and have made a final determination that Oregon has failed to submit an approvable coastal nonpoint program. This decision is based on the State's failure to address the additional management measures for forestry condition. Based on information the State provided

in March, the federal agencies believe that Oregon has now satisfied the conditions for new development and OSDS so these conditions are no longer a basis for the finding that Oregon has failed to submit an approvable coastal nonpoint program.

For further understanding of terms in this document and the basis of this decision, the reader is referred to the following documents which are available at:

- *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (EPA, January 1993);
- *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (NOAA and EPA, January 1993);
- *Flexibility for State Coastal Nonpoint Programs* (NOAA and EPA, March 1995);
- *Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA)* (NOAA and EPA, October 1998);
- *Policy Clarification on Overlap of 6217 Coastal Nonpoint Programs with Phase I and II Stormwater Regulations* (NOAA and EPA, December 2002); and
- *Enforceable Policies and Mechanisms for State Coastal Nonpoint Source Programs* (NOAA and EPA January 2001).

Electronic copies of the documents cited above as well as any other references cited in this document and the Federal Register Notice announcing this action will be available at the following website: <http://coast.noaa.gov/czm/pollutioncontrol>.

SCOPE OF DECISION

This document explains the federal agencies' final finding regarding the additional management measures for forestry condition. This finding forms the basis for the federal agencies' proposed determination that the State has failed to submit an approvable program. The document also notes that the new development and OSDS management measures are no longer a basis for this decision. In addition, the document acknowledges the comments received regarding the adequacy of Oregon's agriculture programs and policies for meeting the 6217(g) agriculture management measures and conditions placed on Oregon's Coastal Nonpoint Program.

NOAA and EPA's final findings in this document are based on information the State has submitted in support of each condition, the federal agencies' knowledge of coastal nonpoint source pollution management in Oregon, and the public comments received. Oregon may—and is encouraged to—continue to work on and improve its program to satisfy all coastal nonpoint program requirements. If, based on a later review of information received from the State subsequent to what the federal agencies considered for this document, NOAA and EPA determine that the State has submitted a fully approvable program, the federal agencies will provide another opportunity for public comment. At this time, the public will be asked to provide comment on whether or not the State has satisfied all conditions placed on its program in 1998 and met all CZARA requirements.

PROPOSED FINDING OF FAILURE TO SUBMIT AN APPROVABLE PROGRAM

The federal agencies find that the State of Oregon has failed to submit an approvable program pursuant to Section 6217(a) of CZARA.

I. UNMET CONDITION

A. ADDITIONAL MANAGEMENT MEASURES— FORESTRY

PURPOSE OF MANAGEMENT MEASURE: The purpose of this management measure is to identify additional management measures necessary to achieve and maintain applicable water quality standards and protect designated uses for land uses where the 6217(g) management measures are already being implemented under existing nonpoint source programs but water quality is still impaired due to identified nonpoint sources.

CONDITION FROM JANUARY 1998 FINDINGS: Within two years, Oregon will identify and begin applying additional management measures where water quality impairments and degradation of beneficial uses attributable to forestry exist despite implementation of the 6217(g) measures. (1998 Findings, Section X).

FINDING: Oregon has not satisfied this condition. By not satisfying the additional management measures for forestry, Oregon has failed to submit an approvable program under CZARA.

RATIONALE: Oregon proposes to address the additional management measures for forestry condition through a combination of regulatory and voluntary programs. While Oregon has made some progress towards meeting this condition, the State has not identified or begun to apply additional management measures to fully address the program weaknesses the federal agencies noted in the January 13, 1998, Findings for Oregon's Coastal Nonpoint Program. Specifically, the State has not demonstrated it has management measures, backed by enforceable authorities, in place to: (1) protect riparian areas for medium and small fish bearing streams, and non-fish bearing (type "N") streams; (2) protect high-risk landslide areas; (3) address the impacts of forest roads, particularly on so-called "legacy" roads; and (4) ensure adequate stream buffers for the application of herbicides, particularly on non-fish bearing streams.

Protection of Riparian Areas: [Insert final rationale]

Forestry Road Additional Management Measures: In the 1998 conditional approval findings, NOAA and EPA called out specific concerns with the ability of Oregon's existing FPA rules to adequately address road density and maintenance, particularly on so-called "legacy" roads, to attain water quality standards and protect designated uses. In the rationale, NOAA and EPA noted that "'legacy' roads, roads constructed and used prior to adoption of the FPA in 1971 and not used or maintained since, were not required to be treated and stabilized before closure. In some locations, this has resulted in significantly altered surface drainage, diversion of water from natural channels, and serious erosion or landslides."

Oregon has established both regulatory and voluntary measures to address road- associated pollutant impacts to water quality, and has suggested that further additional management

measures for roads are not necessary at this time. While NOAA and EPA acknowledge the progress the State has made, as discussed further below, the federal agencies maintain that additional work is needed to ensure the State has adequate additional management measures in place for forestry roads, including legacy roads.

Since 1998, the Board of Forestry has made several improvements to general road maintenance measures to improve water quality. Changes made in 2002 and 2003, included: (1) establishment of a "Critical Locations" Policy for avoiding the building of roads in critical locations such as high hazards landslide areas, steep slopes, or within 50 feet of waterbodies; (2) creation of additional rules to address wet-weather hauling (OAR 629-625-0700), and (3) revision of an existing road drainage rule to reduce sediment delivery (OAR 629-625-0330). These improvements will help reduce sedimentation from roadways. However, the new drainage requirements are triggered only when new road construction or re-construction of existing roads occurs. The rule changes and new policies do not sufficiently address water quality problems associated with "legacy roads" (e.g., roads that do not meet current state requirements with respect to siting, construction, maintenance, and road drainage) or problems associated with a large portion of the existing road network where construction or reconstruction is not proposed.

Oregon proposed to address these legacy road issues and gaps in its FPA rules through voluntary efforts, including restoration and monitoring activities carried out through the voluntary Oregon Plan. For example, in its March 2014 submittal, the State described ODF's voluntary Road Hazard and Identification and Risk Reduction Project where private and state forestland owners survey their road networks to identify roads that pose risks to salmonid habitat and prioritize roads for remediation. Although Oregon reports that thousands of road miles have been inspected and repaired across the state since the inception of this program in 1997, the State did not indicate the impact the program has had within the coastal nonpoint program management area or how many of these projects addressed active forest roads and roads retired according to current FPA practices versus problems associated with older, legacy roads.

Oregon also noted it has entered into a cooperative agreement with the USDA Forest Service to update the State's geographic information system (GIS) data layer for forest roads. The data layer will help the State conduct a rapid road survey to evaluate and prioritize road risks to soil and water resources. Oregon noted it hoped to begin the survey in 2014. NOAA and EPA encourage the State to move forward with the road survey. However, the federal agencies are not aware if the survey and GIS layer will consider legacy roads or how the state will use the data to direct future management actions.

In addition, the State also discussed it was undertaking a third-party audit in 2014 to assess compliance with the FPA rules governing forest road construction and maintenance among other things. While NOAA and EPA encourage the State to continue to conduct this and other audits to assess compliance with FPA rules, as noted earlier, legacy roads are not subject to FPA rules. Issues resulting from legacy roads and general road maintenance issues where construction or reconstruction is not occurring that would trigger compliance would the FPA would not be observed during this audit.

NOAA and EPA recognize that legacy roads are being addressed through voluntary measures, and that legacy roads have been the target of significant landowner investment. However, as noted in the Oregon Coastal Coho Assessment,¹ old roads make up the majority of forest roads, and road inventory data on private land is not widely available. As such, it is not possible to determine the extent to which voluntary efforts have addressed the sedimentation problems and landslide risk posed by the legacy road network.

In addition, as the federal agencies' *1998 Final Administration Changes Memo* states, in order for states to rely on voluntary programs to meet coastal nonpoint program requirements, a state must, among other things: (1) describe the voluntary program, including the methods for tracking and evaluating those programs, the State will use to encourage implementation of the management measures; and (2) provide a legal opinion from its Attorney General asserting the State has adequate back-up enforcement authority for the voluntary measures and commit to exercising the back-up authority when necessary. While the State has provided the federal agencies with a legal opinion detailing the suitability of its back-up authorities, the State has not provided (either in writing or through past practice) a commitment to exercise its back-up authority to require implementation of the additional management measures for forestry roads, as needed. Also, the State has not described specifically how these voluntary efforts have and will continue to address legacy road issues within the coastal nonpoint management area. Nor has the State fully described how it continues to monitor and track the implementation of these measures to address forestry road issues, including legacy roads (not just through one-time compliance audits but through more routine monitoring practices).

Legacy roads remain an issue due to their location and construction. Historic settlement patterns and relative ease-of-construction led early developers to preferentially locate roads in valley bottoms near streams. These roads would often parallel low gradient streams (historically the most productive coho habitat) and cross many tributaries.² Prior to modern best management practices, mid-slope roads would often be connected to these valley bottom roads to access harvest units.³ It is widely recognized that these poorly designed forest roads increase sediment supplied to streams by altering hillslope hydrology, surface runoff, and sediment flux.^{4,5,6,7,8} These roads can also become a chronic source of low level sediment over time.⁹ The ecological consequences of sediment chronically supplied from roads may be equally or even more

¹ Nicholas J., McIntosh, B. and E. Bowles. 2005. Oregon Coastal Coho Assessment. Coho Assessment Part 3B. Oregon Watershed Enhancement Board and Oregon Department of Fish and Wildlife, Salem, Oregon. 49 pp.

² Nicholas J., McIntosh, B. and E. Bowles. 2005. Oregon Coastal Coho Assessment. Coho Assessment Part 1: Synthesis. Oregon Watershed Enhancement Board and Oregon Department of Fish and Wildlife, Salem, Oregon. 69 pp.

³ Wemple, B.C., Swanson, F.J., Jones, J.A., 2001. Forest roads and geomorphic process interactions, Cascade range, Oregon. *Earth Surface Processes and Landforms* 26, 191-204

⁴ Reid, L. M., Dunne, T., 1984. Sediment production from forest road surfaces. *Water Resources Research* 20(11), 1753-1761.

⁵ Luce, C.H., Black, T.A., 1999. Sediment production from forest roads in western Oregon. *Water Resources Research* 35(8), 2561-2570

⁶ Wemple, B.C., Jones, J.A., 2003. Runoff production on forest roads in a steep, mountain catchment. *Water Resources Research* 39, doi:10.1029/2002WR001744

⁷ Skaugset, A. and M. M. Allen. 1998. Forestry Road Sedimentation Drainage Monitoring Project for Private and State Lands in Western Oregon. Prepared for the Oregon Department of Forestry by the Forestry Engineering Department, Oregon State University, February 20, 1998.

⁸ Robison, E.G., Mills K., Paul, J. Dent, L. and A Skaugset. 1999. Storm Impacts and Landslides of 1996: Final Report, Forest Practices Technical Report, vol. 4 Oregon Department of Forestry, Corvallis. 145 pp.

⁹ MacDonald, L.H. and D.B.R. Coe. 2008. Road sediment production and delivery: processes and management. *Proceedings of the First World Landslide Forum, International Programme on Landslides and International Strategy for Disaster Reduction, United Nations University, Tokyo, Japan.* pp. 381-384.

detrimental over time than periodic sediment pulses.¹⁰ Furthermore, legacy roads can serve as initiation points for landslides many years (or even decades) after construction.¹¹ For example, one study found that forestry roads in Oregon built before 1984, have higher landslide rates than those built later.¹²

While ODF's 2002 Sufficiency Analysis found that, except for wet weather road use which the Board has since addressed (see above), complying with the current FPA road best management practices is likely to meet water quality standards, the analysis did not examine the impacts of legacy roads which do not adhere to current forest practices. Oregon's Independent Multidisciplinary Science Team (IMST) did find that:

“‘Old roads and railroad grades’ on forestlands, sometimes called legacy roads, are not covered by the OFPA rules unless they are reactivated for a current forestry operation or purposes. IMST believes the lack of a mechanism to address the risks presented by such roads is a serious impediment to achieving the goals of the Oregon Plan. A process that will result in the stabilization of such roads is needed, with highest priority attention to roads in core areas, but with attention to such roads and railroad grades at all locations on forestlands over time.”¹³

As part of the development process for the Coastal Salmon Restoration Initiative (CSRI) report, which later evolved in to the Oregon Plan for Salmon and Watershed (Oregon Plan), a 1996 National Marine Fisheries Service (NMFS) memo providing the service's scientific analysis of the draft CSRI report identifies the report's omission of forestry road-related problems as a serious inadequacy. NMFS indicated that the forest practice rules have no well-defined process to identify problems with older logging roads and railroad grades constructed prior to 1994.¹⁴

In addition to water quality impacts, sedimentation and erosion from forestry roads have adverse impacts on salmon. For example, logging roads are a source of fine sediments which enter spawning gravel and can lower the success of spawning and recruitment for coho salmon.¹⁵ NOAA National Marine Fisheries Services' scientific analysis for their Endangered Species Act Section 7 listing for Oregon Coast Coho Salmon, also continues to recognize forestry roads, including legacy roads, as a source of sediment and a threat to Oregon coastal coho salmon. NMFS explained that “existing and legacy [forestry] roads can contribute to continued stream

¹⁰ Detenbeck, N.E., P.W. Devore, G.J. Niemi, and A. Lima. 1992. Recovery of temperate stream fish communities from disturbance: a review of case studies and synthesis of theory. *Environ. Manage.* 16:33-53.

¹¹ Oregon Department of Forestry and Oregon Department of Environmental Quality. 2002. Sufficiency Analysis: A Statewide Evaluation of Forest Practices Act Effectiveness in Protecting Water Quality, Oregon Department of Forestry and Oregon Department of Environmental Quality. October 2002.

¹² Oregon Department of Forestry and Oregon Department of Environmental Quality. 2002. Sufficiency Analysis: A Statewide Evaluation of Forest Practices Act Effectiveness in Protecting Water Quality, Oregon Department of Forestry and Oregon Department of Environmental Quality, p. 33, Sessions, 1987.

¹³ Independent Multidisciplinary Science Team. 1999. Recovery of Wild Salmonids in Western Oregon Forests: Oregon Forest Practices Act Rules and the Measures in the Oregon Plan for Salmon and Watersheds. Technical Report 1999-1 to the Oregon Plan for Salmon and Watersheds, Governor's Natural Resources Office, Salem, Oregon. pp. 47

¹⁴ NOAA National Marine Fisheries Service. 1996. “Analysis of the Oregon Department of Forestry's (ODF) Most Recent Submission for the State of Oregon's Coastal Salmon Restoration Initiative”. September 10, 1996 memo from Rowan Baker to Steve Morris and Elizabeth Garr.

¹⁵ Cederholm, C.J., Reid, L.M., Salo, E.O. 1980. “Cumulative Effects of Logging Road Sediment on Salmonid Populations in the Clearwater River, Jefferson County, Washington,” Contribution No. 543, College of Fisheries, University of Washington, Seattle, Washington 98195.

degradation over time through restriction of debris flows, sedimentation, restriction of fish passage, and loss of riparian function.”¹⁶

Despite the improvements the State has made in addressing forestry roads, NOAA and EPA remain concerned that many forest road networks in Oregon continue to deliver sediment into streams. Oregon notes that some legacy roads may have filled in with trees and other vegetation since being retired from active use and that accessing some of these roads to repair them properly may create more disturbance and potential water quality impacts. While this statement may be accurate in some cases, the State did not provide legacy roads inventory data of the coastal area to support its position. An inventory of all legacy roads and old roads (roads built prior to the 1983 rule changes¹⁷) would identify the location of the legacy roads, identify where impairments are needed and provide information on effectiveness of any improvements made via its voluntary roads improvement program.

The suite of voluntary programs Oregon has described may enable the State satisfy the forestry roads element of this condition. However, as discussed above, additional information is needed at this time. The federal agencies encourage the State to provide a commitment to use its back-up authority to ensure implementation of the forestry road additional management measures, when needed and to move forward with establishing a road survey or inventory program that considers both active, inactive, and legacy roads, including a mechanism for tracking and monitoring implementation of these voluntary measures to carry out identified priority forest road improvements. To support an approvable coastal nonpoint program, the program should establish, among other things, a timeline for addressing priority road issues, including retiring or restoring forest roads that impair water quality, and a reporting and tracking component to assess progress for remediating identified forest road problems. Establishing a roads inventory with appropriate reporting metrics would provide valuable information on State and private landowner accomplishments to improve and repair roads and identify where further efforts are needed. Such an approach could help verify whether the combination of current rules and the Oregon Plan’s voluntary measures are effective in managing forest roads to protect streams on a reasonable timeframe.

Landslide Prone Areas: In the 1998 findings, NOAA and EPA placed a condition on Oregon’s program requiring the state to identify and begin applying additional management measures where water quality impairments and degradation of beneficial uses attributable to forestry exist despite implementation of the CZARA 6217(g) measures. The federal agencies identified areas where existing practices under the FPA and FPA rules should be strengthened to attain water quality standards and fully support beneficial uses, among them was the need to provide better protection of areas at high risk for landslides.

Oregon proposes to address the landslide element of the additional management measures for forestry condition through a mix of regulatory and voluntary approaches. While the state has

¹⁶ NOAA National Marine Fisheries Service. 2012. Scientific Conclusions of the Status Review for Oregon Coast Coho Salmon (*Oncorhynchus kisutch*). NOAA Technical Memorandum NMFS-NWFSC-118, June 2012, Pg. 78
http://www.nwfsc.noaa.gov/assets/25/1916_08132012_121939_SROregonCohoTM118WebFinal.pdf

¹⁷ AD HOC Forest Practices Advisory Committee on Salmon and Watersheds. 2000. Report of the Forest Practices Advisory Committee On Salmon and Watersheds. August 2000. Section B-Forestry Roads. p. B-17.

adopted more protective forestry rules to reduce landslide risks to life and property and promotes some voluntary practices to reduce landslide risks through the Oregon Plan for Salmon and Watersheds (The Oregon Plan), Oregon still does not have additional management measures for forestry in place to protect high-risk landslide areas to ensure that water quality standards and designated uses are achieved.

Since receiving conditional approval on January 13, 1998, Oregon amended the Oregon FPA rules to require the identification of landslide hazard areas in timber harvesting plans and road construction and placed certain restrictions on harvest and road activities within these designated high-risk landslide areas for public safety (OAR 629-623-0000 through 629-623-0800). However, under these amendments, shallow, rapidly moving landslide hazards directly related to forest practices are addressed only as they relate to risks for losses of life and property, not for potential water quality impacts. Oregon still allows timber harvest and the construction of forest roads, where alternatives are not available, on high-risk landslide hazard areas as long as it is not deemed a public safety risk.

In addition to these regulatory programs, Oregon stated that it employs a voluntary measure under the Oregon Plan that gives landowners credit for leaving standing live trees along landslide-prone areas as a source of large wood. The large wood, which may eventually be deposited into fish-bearing stream channels, contributes to stream complexity, a key limiting factor for coastal coho salmon recovery. While this is a good management practice, the measure is not designed to protect high-risk erosion areas but rather to ensure large wood is available to provide additional stream complexity when a landslide occurs. NOAA and EPA do not consider this voluntary action as a suitable management measure to reduce high-risk landslides that have the potential to impact water quality.

Also, Oregon has yet to provide all information needed to use voluntary programs to address this aspect of its coastal nonpoint program. To use voluntary approaches to meet CZARA requirements, a state not only needs to describe the voluntary approach but also needs to describe how it will monitor and track implementation of that approach, provide a legal opinion asserting the state has adequate back-up authority to ensure implementation of the management measure, and provide a commitment to use that back-up authority, when needed.

As noted in the January 13, 1998, findings, logging on unstable, steep terrain can increase landslide rates, which contributes to water quality impairments. A number of studies continue to show significant increases in landslide rates after clear cutting compared to unmanaged forests in the Pacific Northwest. For example, Robinson et al. found that in three out of four areas studied in very steep terrain, landslide densities and erosion volumes were greater in stands that were clear-cut during the previous nine years.¹⁸ Landslide rates in Mettman Ridge in the Oregon Coast Range increased after clear cutting at a rate of three to nine times the background rate for the region. The regional analysis from the Mettman Ridge study found that forest clearing dramatically accelerates shallow landsliding in steep terrain typical of the Pacific

¹⁸ Robison, G.R., Mills, K.A., Paul, J. Dent, L. and A. Skaugset. 1999. Oregon Department of Forestry Storm Impacts and Landslides of 1996: Final Report. Oregon Department of Forestry Forest Practices Monitoring Program. Forest Practices Technical Report Number 4.157 pages.

Northwest.¹⁹ In southwestern Washington, rain fall intensity, slope steepness, and stand age affected landslide rates.²⁰ Very few landslides occurred when rainfall was less than or equal to a 100-year rainfall event and at higher rainfall intensities, steep slopes had significantly higher landslide densities compared to lower gradient slopes. In addition, they found that at higher rainfall intensities, the density of landslides in recently harvested sites was roughly two to three times the landslide density in older stands.

Other research has examined the role of root cohesion on landslide susceptibility in forested landscapes. Root cohesion is a measure of the lateral reinforcing strength the root system provides. The higher the root cohesion, the better the root system can stabilize the soil, reducing the risk of landslides.²¹ Schmidt et al. noted that median lateral root cohesion is less for industrial forests with significant understory and deciduous vegetation (6.8–23.2 kPa) compared to natural forests dominated by conifers (25.6–94.3 kPa). Additionally, in clearcuts, Schmidt et al. found also that lateral root cohesion is uniformly less than or equal to 10 kPa, making these areas much more susceptible to landslides.

Sakals and Sidle modeled the effect of different harvest methodologies on root cohesion over time.²² They found that, of the methodologies examined (clear cutting, single tree selection cutting and strip cutting), clear cutting produces the greatest decline in root cohesion. Further, they found that root cohesion may continue to decline for 30 years post-harvest. That decline is attributed to the decay of the root systems of the harvested trees, and the fact that young root systems have smaller root volumes and less radial rooting extent. They concluded that clear cutting on hazard slopes could increase the number of landslides as well as the probability of larger landslides. They also stated that a management approach requiring the retention of conifers on high-risk slopes would increase root cohesion and reduce the risk of landslide.

Not only has the science demonstrated that timber harvesting can contribute to landslides but that these landslides also degrade water quality and impair designated uses in Pacific Northwest streams. Whittaker and McShane cited that:

“In the Pacific Northwest, ... [l]andslides alter aquatic habitats by elevating sediment delivery, creating log jams, and causing debris flows that scour streams and stream valleys down to bedrock (Rood, 1984; Cederholm and Reid, 1987; Hogan et. al., 1998). The short-term and long-term impacts of higher rates of landslides on fish include habitat loss, reduced access to spawning and rearing sites, loss of food resources, and direct mortality (Cederholm and Lestelle, 1974; Cederholm and Salo, 1979; Reeves et. al., 1995). The restoration of geomorphic processes to natural disturbance regimes is crucial to the recovery of endangered salmonids (*Oncorhynchus* spp.) and other aquatic species in the Pacific Northwest as these species evolved under conditions with much lower

¹⁹ Montgomery, D. R., K. M. Schmidt, H. M. Greenberg & W. E. Dietrich. 2000. Forest clearing and regional landsliding. *Geology* 28: 311-314.

²⁰ Turner, T.R., Duke, S.D., Fransen, B.R., Reiter, M.L., Kroll, A.J., Ward, J.W., Bach, J.L., Justice, T. E., and R.E. Bilby. 2010. Landslide densities associated with rainfall, stand age, and topography on forested landscapes, southwestern Washington, USA. *Forest Ecology and Management* 259:2233–2247.

²¹ Schmidt, K.M., Roering, J.J., Stock, J.D., Dietrich, W.E., Montgomery, D.R., and Schaub, T. 2001. The variability of root cohesion as an influence on shallow landslide susceptibility in the Oregon Coast Range, Canada *Geotech. J.* Vol. 38; 997-1024

²² Sakals, M.E. and R.C. Sidle. 2004. A spatial and temporal model of root cohesion in forest soils. *Canadian Journal of Forest Research* 34(4): 950-958.

sediment delivery and landslide frequency (Reeves et. al., 1995; Montgomery, 2004).”²³

In 2013, the Cooperative Monitoring Evaluation and Research committee (CMER) of the Washington State Department of Natural Resources published a study that explored landslide response to a large 2007 storm in Southwestern Washington.²⁴ Within the 91 square mile study area, a total of 1147 landslides were found within harvest units that delivered to public resources (mostly streams). The majority (82%) occurred on hillslopes and the rest initiated from roads. In examining these landslides, the study found that unstable hillslopes logged with no buffer had a significantly (65%) higher landslide density than did mature stands. Unstable slopes logged with no buffer also delivered 347% more sediment than slopes with unlogged, mature stands. The authors conclude that buffers on unstable slopes likely reduce landslide density and sediment volume. This has important implications for water quality and beneficial uses. It is well documented that sediment can clog and damage fish gills, suffocate fish eggs, smother aquatic insect larvae, and fill in spaces in streambed gravel where fish lay eggs. Sediment can also carry other pollutants into waterbodies, creating issues for domestic water supply and public water providers.^{25,26,27,28,29,30}

The science shows clear-cutting increases the rate of landslides and that landslides can adversely affect water quality and beneficial uses. Additional management measures are needed to provide greater protection of landslide prone areas for the protection of water quality in Oregon. To meet this additional management measure requirement, the state needs to establish a suite of measures that collectively address this issue. Examples of measures include but are not limited to the following:

- Adopt harvest and road construction restrictions similar to those applicable in areas where landslides pose risks to life and property, but for all high-risk landslide prone areas with the moderate to high potential to impact water quality and designated uses.
- Develop a scientifically rigorous process for identifying high-risk areas and unstable slopes based on field review by trained staff. Such a process could include the use of slope instability screening tools to identify high-risk landslide areas that take into account site-specific factors such as slope, geology and geography and planned land management activities, such as roads development.

²³ Whittaker, K.A., McShane, D., 2012. Comparison of slope instability screening tools following a large storm event and application to forest management policy. *Geomorphology* 145-146 (2012); 115-122.

²⁴ Stewart, G., Dieu, J., Phillips, J., O'Connor, M., Veldhuisen C., 2013. The Mass Wasting Effectiveness Monitoring Project: An examination of the landslide response to the December 2007 storm in Southwestern Washington; Cooperative Monitoring, Evaluation and Research Report CMER 08- 802; Washington Department of Natural Resources, Olympia, WA.

²⁵ Whittaker, K.A., McShane, D., 2012. Comparison of slope instability screening tools following a large storm event and application to forest management policy. *Geomorphology* 145-146 (2012); 115-122.

²⁶ Cederholm, C.J., Reid, L.M., Salo, E.O. 1980. Cumulative Effects of Logging Road Sediment on Salmonid Populations In The Clearwater River, Jefferson County, Washington. Contribution No. 543, College of Fisheries, University of Washington, Seattle, Washington 98195

²⁷ Jensen, D.W., Steel, E.A., Fullerton, A.H., Pess, G.R., 2009. Impact of Fine Sediment on Egg-To-Fry Survival of Pacific Salmon: A Meta-Analysis of Published Studies, *Reviews in Fisheries Science*: 17(3):348-359, Northwest Fisheries Science Center, NOAA Fisheries, Seattle Washington, USA

²⁸ USEPA, 2003. *Developing Water Quality Criteria for Suspended and Bedded Sediments (SABS): Potential Approaches*. (Draft, August 2003)

USEPA Region 10 and Idaho Water Resources Research Institute. 1999. *Aquatic Habitat Indicators and their Application to Water Quality Objectives within the Clean Water Act*. July 1999. Section 3, p. 20. EPA 910-R-99-014

³⁰ Oregon Department of Environmental Quality, Turbidity Standards, Background Information. <http://www.deq.state.or.us/wq/standards/turbidity.htm>

- Develop more robust voluntary programs to encourage and incentivize the use of forestry best management practices to protect high-risk landslide areas that have the potential to impact water quality and designated uses, such as employing no-harvest restrictions around high-risk areas and ensuring that roads are designed, constructed, and maintained in such a manner that the risk of triggering slope failures is minimized. Widely available maps of high-risk landslide areas could improve water quality by informing foresters during harvest planning.
- Institute a monitoring program to track compliance with the FPA rules and voluntary guidance for high-risk landslide prone areas and the effectiveness of these practices in reducing slope failures.
- Establish an ongoing monitoring program that assesses the underlying causes and water quality impacts of landslides shortly after they occur and generates specific recommendations for future management. In particular, look for ways to reduce the occurrence of channelized landslides.
- Integrate processes to identify high-risk landslide prone areas and specific best management practices to protect these areas into the TMDL development process. For example, in the Mid-Coast Basin, DEQ is currently developing a sediment TMDL to address water quality limited waters for biocriteria, turbidity, and sediment. To support the development of the TMDL, the Oregon Department of Geology and Mineral Resources completed landslide inventory maps for two watersheds in the Mid-Coast Basin finding hundreds of previously unidentified landslides.³¹ As part of the TMDL DEQ would be completing a source assessment of the landslides in relationship to the water quality impairments. NOAA and EPA encourage the state to complete this TMDL and include specific practices that landowners will need to follow in order to reduce pollutants causing impairments addressed in the TMDL.

If the Oregon plans to rely on voluntary efforts, the state would need to describe the full suite of voluntary practices it plans to use address this management measure, how the state would promote these voluntary practices, and meet the other requirements when using voluntary programs to meet 6217(g) management measure requirements (i.e., a legal opinion asserting the state has back-up authority to ensure implementation of the management measure, a commitment to use the back-up authority, and a description of the monitoring and tracking program the state will use to assess how it will monitor and track implementation of the voluntary approach).

Buffers for Pesticide Application on Non-Fish Bearing (Type N) Streams: [Insert final rationale]

II. CONDITIONS THAT ARE NO LONGER A BASIS FOR THIS DECISION

³¹ Burns, W. J., Duplantis, S., Jones, C., English, J., 2012. LIDAR Data and Landslide Inventory Maps of the North Fork Siuslaw River and Big Elk Creek Watersheds, Lane, Lincoln and Benton Counties, Oregon. Open-File Report O-12-07, Oregon Department of Geology and Mineral Industries.

A. URBAN AREAS MANAGEMENT MEASURES – NEW DEVELOPMENT

PURPOSE OF MANAGEMENT MEASURE: The purpose of this management measure is four-fold: (1) decrease the erosive potential of increased volumes and velocities of stormwater associated with development-induced changes in hydrology; (2) remove suspended solids and associated pollutants entrained in runoff that result from activities occurring during and after development; (3) retain hydrological conditions that closely resemble those of the pre-disturbance condition; and (4) preserve natural systems including in-stream habitat.

CONDITION FROM JANUARY 1998 FINDINGS: Within two years, Oregon will include in its program: (1) management measures in conformity with the 6217(g) guidance; and (2) enforceable policies and mechanisms to ensure implementation throughout the coastal nonpoint management area. (1998 Findings, Section IV.A).

FINDING: Based on information provided in Oregon's March 2014 submission, NOAA and EPA now believe the State has satisfied this condition. The new development management measure is no longer a basis for finding that the Oregon has failed to submit an approvable program under CZARA.

RATIONALE NOT INCLUDED: NOAA and EPA will provide a rationale for public comment if/when the federal agencies are in a position to propose full approval of Oregon's coastal nonpoint pollution control program at a later point in time.

B. OPERATING ONSITE SEWAGE DISPOSAL SYSTEMS

PURPOSE OF MANAGEMENT MEASURE: The purpose of this management measure is to minimize pollutant loadings from operating OSDS.

CONDITION FROM JANUARY 1998 FINDINGS: Within two years, Oregon will finalize its proposal to inspect operating OSDS, as proposed on page 143 of its program submittal. (1998 Findings, Section IV.C).

FINDING: Based on information provided in Oregon's March 2014 submission, NOAA and EPA now believe the State has satisfied this condition. The OSDS management measure is no longer a basis for finding that the Oregon has failed to submit an approvable program under CZARA.

RATIONALE NOT INCLUDED: NOAA and EPA will provide a rationale for public comment if/when the federal agencies are in a position to propose full approval of Oregon's coastal nonpoint pollution control program at a later point in time.

III. ADDITIONAL COMMENTS

A. AGRICULTURAL MANAGEMENT MEASURES--EROSION AND SEDIMENT CONTROL, NUTRIENT, PESTICIDE, GRAZING, AND IRRIGATION WATER MANAGEMENT

As noted in the Foreword, the federal agencies invited public comment on the adequacy of the State's programs and policies for meeting the 6217(g) agriculture management measures and conditions placed on Oregon's Coastal Nonpoint Program.

PURPOSE OF MANAGEMENT MEASURES: The purposes of these management measures are to: (1) reduce the mass load of sediment reaching a waterbody and improve water quality and the use of the water resource; (2) minimize edge-of-field delivery of nutrients and minimize leaching of nutrients from the root zone; (3) reduce contamination of surface water and ground water from pesticides; (4) reduce the physical disturbance to sensitive areas and reduce the discharge of sediment, animal waste, nutrients, and chemicals to surface waters; and (5) reduce nonpoint source pollution of surface waters caused by irrigation.

CONDITIONS FROM JANUARY 1998 FINDINGS: Within one year, Oregon will (1) designate agricultural water quality management areas (AWQMAs) that encompass agricultural lands within the coastal nonpoint management area, and (2) complete the wording of the alternative management measure for grazing, consistent with the 6217(g) guidance. Agricultural water quality management area plans (AWQMAPs) will include management measures in conformity with the 6217(g) guidance, including written plans and equipment calibration as required practices for the nutrient management measure, and a process for identifying practices that will be used to achieve the pesticide management measure. The State will develop a process to incorporate the irrigation water management measure into the overall AWQMAPs. Within five years, AWQMAPs will be in place. (1998 Findings, Section II.B).

DISCUSSION: In 2004, the federal agencies provided Oregon with an informal interim approval of its agriculture conditions, believing that the State had satisfied those conditions, largely through its Agriculture Water Quality Management Act (ORS 568.900-933, also known as SB 1010) and nutrient management plans (ORS-468B, OAR-60374). At that time, the federal agencies found that these programs demonstrated that the State has processes in place to implement the 6217(g) management measures for agriculture as CZARA requires.

Although the federal agencies initially found that these programs enabled the State to satisfy the agriculture condition, prior to announcing the proposed decision, some specific concerns with the State's agriculture program were brought to the federal agencies' attention such as:

- Enforcement is limited and largely complaint-driven; it is unclear what enforcement actions have been taken in the coastal nonpoint management area and what improvements resulted from those actions.
- The AWQMA plan rules are general and do not include specific requirements for implementing the plan recommendations, such as specific buffer requirements to adequately protect water quality and fish habitat.
- AWQMA planning has focused primarily on impaired areas when the focus should be on both protection and restoration.
- The State does not administer a formalized process to track implementation and effectiveness of AWQMA plans.

- AWQMA planning and enforcement does not address “legacy” issues created by agriculture activities that are no longer occurring.

Given these concerns, NOAA and EPA chose to solicit additional public comment on whether the State had satisfied the 6217(g) agriculture management measure requirements and the conditions related to agriculture placed on its program. The federal agencies appreciate the comments provided and are considering them closely. NOAA and EPA will work with the State, as necessary, to ensure it has programs and policies in place to satisfy all CZARA 6217(g) requirements for agriculture before proposing and making a final decision that the State has a fully approved coastal nonpoint program. For a summary of the comments received related to agriculture, see <http://coast.noaa.gov/czm/pollutioncontrol/>.